



Game-changing P&A approach changed days per well to wells per day



In early 2017, a major operator began an asset retirement campaign, abandoning 3,000 to 4,000 wells on 311 platforms in the Gulf of Thailand.

Plug and abandonment (P&A) operations were split into two phases—lower (reservoir) and upper (intermediate) abandonment. The scope of work included four different well types with pipe sizes ranging from 2 ⁷/₈-in. tubing to 30-in. conductors.

Days per well reduced

The operator contacted Baker Hughes, a GE Company (BHGE) to perform P&A operations on 20 shallow-water wells on the first platform. This included tubing pulling, casing cutting and pulling, cementing services, mechanical plug setting, and well integrity evaluation. These wells were constructed with a 9 ⁵/₈-in. x 7-in. x 2 ⁷/₈ in. casing configuration.

The barrier philosophy included a 7-in. cast iron bridge plug and 9 ⁵/₈-in. cement retainer in each well for cement placement and squeezing operations.

The operator's work breakdown schedule estimated an average execution of 1.1 days per well. BHGE, in collaboration with the rig contractor, continuously improved on this time, achieving an average uptime execution of 0.4 days per well. This efficiency was partially achieved by batch-pulling of the 9 ⁵/₈-in. surface casing.

Based on its performance on the first platform, BHGE was awarded an additional scope of work. This included the removal of subsea tieback wells with 26-in. x 13 ³/₈-in. x 9 ⁵/₈-in. x 7-in. cemented casing strings. Since cutting four nested casing strings mechanically is sub-optimal, abrasive water jet cutting technology was used to efficiently cut this configuration. Abrasive water jet cutting was also used for eight of the platform's twin wells having two 9 ⁵/₈ in. casings nested and cemented inside 30-in. conductors.

A first in Thailand

Some wells proved more challenging than others. When a production tubing string was found plugged with cement the tubing couldn't be cut internally.

Results

- Completed 280 well P&As on 16 different platforms within nine months on a single rig
- Reduced on-well time from average 1.1 days to 0.4 day
- Successfully ran more than 300 cement retainers and bridge plugs
- Saved trips by combining cement retainer setting and pressure testing with a packer in a single trip
- Executed another 94 well P&As on 14 platforms from different rigs to fill-in the drilling schedule; successfully ran more than 100 bridge plugs and cement retainers

Challenges

- Inadequate well information
- Highly corroded, leaking, and parted surface casing
- Cemented nested casing strings and twin well conductor removals
- Plugged tubing IDs and stuck barrier plugs

Coiled tubing was mobilized to drill out the cement but was not as efficient as anticipated. BHGE decided to washover the tubing string, providing external cutting access. A 5 ⁷/₈-in. external cutter deployed on 5 ³/₄-in. washpipe was used to cut the tubing below the safety valve and recovered 1,200 ft (366 m) of 2 ⁷/₈-in. cement-filled tubing. On surface, the tubing was stripped out of the washpipe using a false rotary table, a first for BHGE in Thailand.



A platform's empty slots after P&A

BHGE saved the operator time and money by combining casing integrity verification and the cement squeeze operation. The **AD-1™ tension set packer**, which can check for casing integrity, was run in combination with the **K-1™ cement retainer setting tool**.

In nine months, BHGE has completed 280 well P&As on 16 platforms on a single rig with over 300 bridge plugs/cement retainers successfully set. In addition, a further 94 wells on 14 platforms were plugged and abandoned from different rigs within the same timeframe with more than 100 bridge plugs/cement retainers successfully set.

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